UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/847,746	05/01/2001	Robert Bartola	257/267	6090

7590 06/28/2004

Andreas Grubert
Baker Botts L.L.P.
One Shell Plaza
910 Louisiana Street
Houston, TX 77002-4995

EXAMINER	
DATSKOVSKIY, MICHAEL V	

ART UNIT	PAPER NUMBER
2835	

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/847,746	BARTOLA ET AL.	
	Examiner	Art Unit	
	Michael V Datskovskiy	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12,14,16-24,26-35 and 37-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *12,14,16-24,26-35 and 37-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 July 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 20 is objected to because of the following informalities: Claim 20 should depend on claim 12 instead of 19, because as a parent claim 19 already claimed an absence of a mounting flange. For the purpose of the further speed prosecution examiner will consider claim 20 as dependent on claim 12. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 24, 28-30, 32-35, 38-40 and 42-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Seshan et al.

Seshan et al teach an assembly 10, Figs.1-4, comprising: a plurality of heat-generating packages 14 each including semiconductor die 144 mounted on a substrate 142; said heat-generating packages 14 attached to a multi-layer circuit board (PCB) 22; a thermal management system comprising: a pump 140 separate from the PCB 22; a heat sink 110 separate from said PCB 22; and a coolant circulation loop, wherein parts of said loop are formed as channels in layers of the multi-layer circuit board 22, and part of said loop is an interior lumen of said heat sink 110. Seshan et al teach furthermore: said coolant could

be in a gas or liquid form; and a portion of said channels is formed by a surface of said packages 14 to provide direct contact between them and said coolant.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 12, 14, 17-19, 21-23, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshan et al in view of Bezama et al.

Seshan et al teach all the limitations of the claims except a portion of the channels is formed by removal of portions of one or more layers of the PCB. Bezama et al teach an assembly 10, Figs.1-3, comprising: a heat-generating package 28 including semiconductor die mounted on a multi-layer circuit board (PCB) 12; which is a part management system comprising a coolant circulation loop, wherein parts of said loop are formed as channels in layers of the multi-layer circuit board 12 manufactured by removing portions of one or more layers of the PCB 12. It would have been obvious to one skilled in the art at the time invention was made to make said channels by removing parts of said circuit board in the device by Seshan et al as it is shown by Bezama et al in order to employ one of the well known in the art technological methods: chemical etching or machining channels in a layer of a circuit board.

6. Claims 16, 27 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshan et al in view of Kragl et al.

Seshan et al teach all the limitations of the claims except a portion of the channels is formed by coinciding vias located in adjacent layers of the multi-layer PCB. Kragl et al teach a multi-layer circuit board 5, Figs.1-14, comprising: a mounting place 28 for a heat-generating semiconductor die, said multi-layer circuit board 5 is a part of a heat management system comprising a coolant circulation loop, wherein parts of said loop are formed as channels in layers of the multi-layer circuit board 5 manufactured by coinciding vias located in adjacent layers 10 of the multi-layer PCB 5. It would have been obvious to one skilled in the art at the time invention was made to make said channels by coinciding vias located in adjacent layers of the multi-layer PCB in the device by Seshan et al as it is shown by Kragl et al in order to employ one of the well known in the art technological methods.

7. Claims 20, 31 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seshan et al in view of Little.

Seshan et al teach all the limitations of the claims except said transistor die as attached to a mounting flange which in turn is attached to said circuit board communicating with said cooling channels. Little teaches an assembly, Figs.1-19, comprising: a heat generating device 19 or 94 (a chip or a transistor) attached to a multiplayer printed circuit board without a flange (device 19) or through a flange 71 (device 94), and a thermal management system comprising a pump (condenser and compressor respectively, col.5, lines 40-46) arranged for circulating a coolant through a coolant circulation channel loop 29, 31, wherein one part of the loop is formed in a layer of the PCB, and wherein a portion of the coolant cooling channel is in a vicinity of a mounting area of a flange 71 of said heat generating device 94. It would have been obvious to one skilled in the art at the

time invention was made to employ a flange between a heat-generating device and a cooling channel on a surface of a PCB in order to facilitate sealing of said cooling liquid loop.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dubuisson et al (US Patent 4,859,520); and Loo et al (US Patent 5,380,956).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V Datskovskiy whose telephone number is (571) 272-2040. The examiner can normally be reached on 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on ((571) 272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

06/24/04

Michael V Datskovskiy
Primary Examiner
Art Unit 2835